**LAB 7 SUBNET MASKING**

COMPLETE THE FOLLOWING 2 PROBLEMS – You have completed Example 1in Class and the answer is given here as a reference.

**ANSWER EXAMPLE I**

**Your new Company has applied and received a public IP address from your local ISP. The address is 218.5.67.0/24**

1. What is the Class of this IP address? Class C
2. What is the network address for your company? 218.65.67.0
3. What is the maximum number of hosts you can have on your network? 254
4. What is the broadcast address for your entire network? 218.5.67.255
5. What is the default subnet mask for this network? 255.255.255.0

You require 5 subnets.

1. How many host bits do you need to use to create subnet identifiers? 3
2. What is the new customised subnet mask for this network? 255.255.255.224
3. What is the maximum number of hosts that can be connected to each subnet? 30
4. What is the maximum number of hosts you can have on your entire new subnetted network? (8x30 = 240)

Complete the table overleaf .

The following data packets arrive at your network’s border router.

Determine which subnet that the data is destined for and to which host on that subnet they are addressed for.

1. 218.5.67.89 #2
2. 218.5.67.23 #0
3. 218.5.67.109 #3
4. 218.5.67.91 #2
5. 218.5.67.64 #2 (subnet address)
6. 218.5.67.252 #7
7. 218.5.67.115 #3
8. 218.5.67.143 #4 **Check your answers using Solar Winds Subnet Calculator**

**ANSWER EXAMPLE I**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Subnet No.** | **Subnet Bits - Binary** | **Subnet Bits - Decimal** | **Binary Range**  **of Host Bits** | **Decimal Range**  **SN+Host Bits** | **Subnet Address** | **Subnet**  **Broadcast Address** |
| #0 | 000 | 0 | 00000-11111 | 0-31 | 218.5.67.0 | 218.5.67.31 |
| #1 | 001 | 32 | 00000-11111 | 32-63 | 218.5.67.32 | 218.5.67.63 |
| #2 | 010 | 64 | 00000-11111 | 64-95 | 218.5.67.64 | 218.5.67.95 |
| #3 | 011 | 96 | 00000-11111 | 96-127 | 218.5.67.96 | 218.5.67.127 |
| #4 | 100 | 128 | 00000-11111 | 128-159 | 218.5.67.128 | 218.5.67.159 |
| #5 | 101 | 160 | 00000-11111 | 160-191 | 218.5.67.160 | 218.5.67.191 |
| #6 | 110 | 192 | 00000-11111 | 192-223 | 218.5.67.192 | 218.5.67.223 |
| #7 | 111 | 224 | 00000-11111 | 224-255 | 218.5.67.224 | 218.5.67.255 |

**ANSWER EXAMPLE II**

**Your new Company has applied and received a public IP address from your local ISP. The address is 153.218.0.0/16**

1. What is the Class of this IP address? Class B
2. What is the network address for your company? 158.218.0.0
3. What is the maximum number of hosts you can have on your network? 2^16 -2 = 65534
4. What is the broadcast address for your entire network? 153.218.255.255
5. What is the default subnet mask for this network? 255.255.0.0

You require 12 subnets.

1. How many host bits do you need to use to create subnet identifiers? 4
2. What is the new customised subnet mask for this network? 255.255.240.0
3. What is the maximum number of hosts that can be connected to each subnet? 2^12 -2 = 4094
4. What is the maximum number of hosts you can have on your entire new subnetted network? 14\*4094 = 57316

Complete the table overleaf .

The following data packets arrive at your network’s border router.

Determine which subnet that the data is destined for and to which host on that subnet they are addressed for.

1. 153.218.206.56 #12
2. 153.218.191.255 #11 (broadcast address)
3. 153.218.38.117 #2
4. 153.218.127.127 #7
5. 153.218.96.0 #6 (subnet address)
6. 153.218.192.0 #12 (subnet address)
7. 153.218.15.241 #0
8. 153.218.241.15 #15
9. 153.218.99.100 #6
10. 153.218.159.255 #9 (broadcast address) **Check your answers using Solar Winds Subnet Calculator**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Subnet No.** | **Subnet Bits – Binary**  **(octet 3)** | **Subnet Bits - Decimal** | **Binary Range**  **of Host Bits** | **Decimal Range**  **SN+Host Bits**  **(last 2 octets)** | **Subnet Address** | **Subnet**  **Broadcast Address** |
| #0 | 0000 | 0 | 0000 00000000 –  1111 11111111 | 0.0 – 15.255 | 153.218.0.0 | 153.218.15.255 |
| #1 | 0001 | 16 | 0000 00000000 –  1111 11111111 | 16.0 – 31.255 | 153.218.16.0 | 153.218.31.255 |
| #2 | 0010 | 32 | 0000 00000000 –  1111 11111111 | 32.0 – 47.255 | 153.218.32.0 | 153.218.47.255 |
| #3 | 0011 | 48 | 0000 00000000 –  1111 11111111 | 48.0 – 63.255 | 153.218.48.0 | 153.218.63.255 |
| #4 | 0100 | 64 | 0000 00000000 –  1111 11111111 | 64.0 – 79.255 | 153.218.64.0 | 153.218.79.255 |
| #5 | 0101 | 80 | 0000 00000000 –  1111 11111111 | 80.0 – 95.255 | 153.218.80.0 | 153.218.95.255 |
| #6 | 0110 | 96 | 0000 00000000 –  1111 11111111 | 96.0 – 111.255 | 153.218.96.0 | 153.218.111.255 |
| #7 | 0111 | 112 | 0000 00000000 –  1111 11111111 | 112.0 – 127.255 | 153.218.112.0 | 153.218.127.255 |
| #8 | 1000 | 128 | 0000 00000000 –  1111 11111111 | 128.0 – 143.255 | 153.218.128.0 | 153.218.143.255 |
| #9 | 1001 | 144 | 0000 00000000 –  1111 11111111 | 144.0 – 159.255 | 153.218.144.0 | 153.218.159.255 |
| #10 | 1010 | 160 | 0000 00000000 –  1111 11111111 | 160.0 – 175.255 | 153.218.160.0 | 153.218.175.255 |
| #11 | 1011 | 176 | 0000 00000000 –  1111 11111111 | 176.0 – 191.255 | 153.218.176.0 | 153.218.191.255 |
| #12 | 1100 | 192 | 0000 00000000 –  1111 11111111 | 192.0 – 207.255 | 153.218.192.0 | 153.218.207.255 |
| #13 | 1101 | 208 | 0000 00000000 –  1111 11111111 | 208.0 – 223.255 | 153.218.208.0 | 153.218.223.255 |
| #14 | 1110 | 224 | 0000 00000000 –  1111 11111111 | 224.0 – 239.0 | 153.218.224.0 | 153.218.239.255 |
| #15 | 1111 | 240 | 0000 00000000 –  1111 11111111 | 240.0 – 255.255 | 153.218.240.0 | 153.218.255.255 |

**ANSWER EXAMPLE III**

**Your new Company has applied and received a public IP address from your local ISP. The address is 11.5.67.64/26**

Before SUBNETTING

1. What is the Class of this IP address? Class A
2. What is the network address for your company? 11.65.67.64
3. What is the maximum number of hosts you can have on your network? 62
4. What is the broadcast address for your entire network? 11.5.67.127
5. What is the default subnet mask for this network? 255.255.255.192

You require 3 subnets.

1. How many host bits do you need to use to create subnet identifiers? 2
2. What is the new customised subnet mask for this network? 255.255.255.240
3. What is the maximum number of hosts that can be connected to each subnet? 14
4. What is the maximum number of hosts you can have on your entire new subnetted network? (4x14 = 56 hosts)

Complete the table overleaf.

Data packets arrive at your network’s border router with the following destination IP addresses.

Determine which subnet that the data is destined for and to which host on that subnet they are addressed for.

1. 11.5.67.89 Subnet #1 Host No. 9
2. 11.5.67.73 Subnet #0 Host No. 9
3. 11.5.67.109 Subnet #2 Host No. 13
4. 11.5.67.117 Subnet #3 Host No. 5
5. 11.5.67.94 Subnet #1 Host No. 14
6. 11.5.67.125 Subnet #3 Host No. 13
7. 11.5.67.115 Subnet #3 Host No. 3
8. 11.5.67.68 Subnet #0 Host No. 4 **Check your answers using Solar Winds Subnet Calculator**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Subnet No.** | **Subnet Bits - Binary** | **Subnet Bits - Decimal** | **Binary Range**  **of Host Bits** | **Decimal Range**  **SN+Host Bits** | **Subnet Address** | **Subnet**  **Broadcast Address** |
| #0 | 00 | 0 | 0000-1111 | 0-15 | 11.5.67.64 | 11.5.67.79 |
| #1 | 01 | 16 | 0000-1111 | 16-31 | 11.5.67.80 | 11.5.67.95 |
| #2 | 10 | 32 | 0000-1111 | 32-47 | 11.5.67.96 | 11.5.67.111 |
| #3 | 11 | 48 | 0000-1111 | 48-63 | 11.5.67.112 | 11.5.67.127 |